Governor's Office of
Economic Development
Centers of Excellence

Funding Recipients for the Fall 2010-11 Solicitation of the Utah Centers of Excellence Program

Total proposals submitted: 45
Total awarded funding: 21
- **12 Licensees,**
- **5 Affiliates,**
- **2 UU Internal teams**
- **2 USU internal teams**

The technologies are emerging from the following universities:
- **5 from BYU**
- **11 from UU**
- **5 from USU**

LICENSEES

Anaerobic Digestion Technologies, Inc.
CEO/Principal: Jason Miller
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 – Company

A patent-pending, low-cost, low-maintenance, scalable methane filtration solution. The system is comprised of multiple filter cylinders and gas routing hardware, with an automated electronic control system. The BCS is skid-mounted for easy delivery and installation. The System removes corrosive contaminants and impurities from well-produced and waste-generated methane gas streams at 1/10th to 1/15th the cost of currently marketed technologies. Hydrogen sulfide, water, and other destructive agents are extracted to negligible levels by the BCS, significantly prolonging the life of pipeline infrastructure and electrical generation equipment associated with gas resources. Ground-breaking innovation is manifest in the thermal management system of the BCS. Low levels of excess system heat are utilized to replenish the filter beds and release contaminants in a concentrated gas stream. Successful management of this process makes the system unique and industry-changing in character.

Aviradyne Technologies, Inc.
CEO/Principal: Ronald D. Jones
Univ.: USU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – Univ

Hybrid rockets are significantly safer than Liquid and Solid counterparts. Hybrid motors can be stored and operated without risk of explosion. This makes hybrids ideal for commercial spaceflight except for two significant short-comings attributable to current manufacturing processes: motor-to-motor variability that precludes motor clustering, and lack of a for volume production method to support the required flight rates for the growing commercial space launch industry. The proposed production method uses robotic manufacturing technologies to effectively remedy both of these deficiencies: Digital-Direct Manufacturing to fabricate hybrid rocket fuel grains that are uniformly produced, and Filament/Tape Winding systems to form the composite case and assemble the motor in a single process. Factory automation and application of advanced polymer materials will significantly reduce motor-to-motor performance variability, enable FAA certification, and cut production costs by more than 50%.

Black Box Engineering, Inc.
CEO/Principal: Zac Humes
Univ.: USU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – Company

Coanda Assisted Spray Manipulator (CSM) gives the user the ability to change the direction of the flow of flame and particles leaving existing flame spray guns. The CSM will be designed as an add-on to existing flame spray gun technology. These flame spray guns are used for coating the interior of pipes, cylinders, and other surfaces using different materials. The coatings are used to improve performance of the substrate and reduce maintenance costs. Current technology limits this process to being performed on large diameter pipes, usually greater than 48 inches in diameter, because it requires a person to be inside the pipe to control the direction of the flow. The CSM device will allow the process to be completed on smaller diameter pipes and surfaces without the need for human labor to control the direction of the flow. This process will also be completed more quickly, accurately, and affordably as it removes the need for such intensive manual labor as is currently necessary.

CAT-Credibility Assessment Technologies
CEO/Principal: Donald R. Sanborn
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT
Award Amt.: $40,000 – Company

Oculomotor Deception Detection© (ODD) holds significant promise for numerous security screening and intelligence applications. This revolutionary technology, based on five years of scientific research, provides a powerful new methodology for detecting deception. The ODD measures cognitive responses to deception as detected by a highly accurate eye tracking system that records eye movements and pupil diameter changes as a subject reads true/false questions presented by a computer. The current standard for lie detection technology is the polygraph which takes up to 3 hours to administer, requires a highly skilled examiner, costs about $970 and is 85% accurate. The ODD test takes only 25 minutes, is easily-administered by minimally trained examiners and costs a fraction of the polygraph with the same accuracy.

Crocker Spinal Technologies
CEO/Principal: David Hawkes
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 - University

The FlexSuRe™ is a spinal implant developed at BYU and licensed by Crocker Spinal Technologies, Inc. The FlexSuRe™ was designed to restore stability to the spine after surgeries such as discectomy or laminectomy. It shares load with other spinal structures, maintaining healthy motion while providing mechanical resistance to painful, nonphysiologic motion. The existing FlexSuRe™ is already market-separated due to its unique compliant-mechanism design. However, based on recommendations by the surgeon advisor board advising Crocker Spinal Technologies, the implant can be improved to increase its market acceptance. The COE award will be used to change the existing design to decrease size, modify orientation, and restore height to the segment. As a result, the device will restore nutrient flow to the disc while biomechanically mimicking the motion of a healthy segment. These characteristics make the device forward-looking to complementary technologies for spinal disc regeneration.

E-Sens
CEO/Principal: Jack Buchanan
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – Company

Sensicore has developed a silicon-based chemical sensing technology to address the world's water monitoring needs. The company's lab-on-a-chip sensors monitor multiple chemicals with an array of sensors selective to different analytes. The sensor array takes advantage of the mass fabrication manufacturing technology of the semiconductor industry to produce a low cost per test solution. The sensor array chip will be replaced periodically, eliminating the need for constant maintenance of the sensors. Its small size reduces the need for calibration solution, making it practical to produce small hand-held sensing systems, and to implement remote, unattended sensor network nodes.

Fusion Diagnostics
CEO/Principal: Ben Rollins
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 – Company

Developing glasses with a novel coating that blocks the light spectrum that triggers migraines and other neurological disorders such as blepharospasm. By wearing these coated glasses, migraine sufferers may experience significant reduction in the frequency and severity of their migraine attacks. These coatings can be applied to spectacle lenses, contact lenses, and various types of light sources.

HOT Water Global
CEO/Principal: Brandon Lloyd
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – University

This new technology involves repeated pressure cycles each consisting of a compression stage and a venting stage. The compression stage reaches 100-150 psi in the headspace of a closed vessel by use of a compressor, saturating the water being treated with an ozone/air mixture. The venting stage (to ambient pressure) produces rapidly expanding gas bubbles of all sizes from nano, micro, and centimeter sizes that provide abundant reactive interfacial ozone for ozone and contaminants. Repeated pressure cycles result in conversion of dispersed and

dissolved oil into forms that can be removed by conventional sand filtration or biodegradable products. This project will use a pilot reactor (200 L) to demonstrate treatment of produced water and flow-back water from the oil and gas industry. The process represents an application of University Technology (U-3996).

Microsurgical Innovations
CEO/Principal: Jay Agarwal
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $20,000 – Company; $20,000 – Univ.

An arterial anastomotic device, referred to as an arterial coupling device (ACD), which will replace the hand suturing technique currently used to connect arteries in microsurgery and macrovascular end-to-end arterial repair surgeries. This device would consist of a barbed cap that would be placed at the end of each artery and then connected together to attach the two arterial ends. This approach would reduce the time required in the surgery suite, reduce costs associated with surgery, and reduce the likelihood of failure of the anastomoses, by minimizing human error and stenting open the anastomosis. There are currently no arterial anastomotic devices available. This technology has the ability to simplify technically challenging microvascular repair and to expand the scope of microsurgery by facilitating these types of procedures in third world countries and in battlefield hospital settings.

Solan LLC
CEO/Principal: Brandon Lloyd
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – University

A technology that will fabricate solar cells based on lithographically defined graphite, so-called carbon nanoribbons (CNRs). The electronic properties of CNRs exhibit a dependence on the ribbon dimension. Reducing ribbon width to nanometer scale can turn graphite into a semiconductor, and with the proper selection of metal contacts with different work functions, one can form Schottky barrier solar cells. Upon excitation of the incident light, free electrons and holes will be generated within CNRs. Due to device building-in potential, which equals to the difference in between the two metal leads, free electrons and holes will be extracted to the electrodes, generating electricity. Due to the abundance of graphite material and convenience to tune the material bandgap, we expect to fabricate low-cost and high-efficiency solar cells. A patent, filed on this invention jointly by University of Utah and University of Wisconsin-Madison, has been allowed and licensed to Solan.

TranquilMed
CEO/Principal: Jared Edgel
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 - Company

RestEasy will be the only non-drug treatment for Restless Legs Syndrome (RLS) on the market. It uses patent pending treatment of near-infrared light that penetrates the skin deep into the tissue. Dr Mitchell's studies show 52% reduction in RLS symptoms in 12 treatments and give a p-value less than 0.001. Our device consists of a neoprene pad with adjustable straps. The back of the pad has an array of LEDs that when applied to the lower leg emits near-infrared light that penetrates the skin. This releases Nitric Oxide which then causes the blood vessels to dialate. Vasodilation in turn increases blood flow, satisfying the urge to move and mitigating RLS symptoms. Features for safe home-use and convenience include: a lithium-ion battery that allows free movement during treatment and a control interface that is simple to use. Additionally the device has thermocouples in place to shut the device down if the temperature of the leg gets too high.

Veritract, LLC
CEO/Principal: Arlo McGinn
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 - Company

Nasogastric feeding tubes are the most commonly placed gastrointestinal devices in hospitals today. Over 80% of ICU patients and many more patients in general hospital floors (1.25 million total US patients) receive nutrition via these tubes. Because most of these feeding tubes are placed blindly, without any guidance, many thousands of these tubes are misplaced to the lung causing serious injury and even death. To verify proper placement, most hospitals require X-ray confirmation of tube placement but incur significant extra expense as a result. Veritract leverages the advancements made in endoscopic technology to allow these technologies to be built into an inexpensive disposable device. Our design integrates optics for vision, and steering for guidance, allowing feeding tubes to be guided and placed into the intestinal tract under direct visualization. This allows for a much quicker, safer, and economical placement and improves patient care while streamlining hospital procedures.

AFFILIATE COMPANIES

Cajun Archery
CEO/Principal: David White
Univ.: USU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE
Award Amt.: $12,500 – University.

Through a market analysis, Cajun Archery, a manufacturer and supplier of bowfishing equipment, has identified a need for a bowfishing reel. Currently, there are two bowfishing reels that dominate the bowfishing market. One of these reels releases line very efficiently, while the other retrieves line well. Neither reel excels at performing both of these tasks. This project is to design a bowfishing reel that is able to both release and retrieve line efficiently, is easy to operate, requires minimal maintenance, and is cost effective to manufacture. Through the use of computer-aided design (CAD) rapid prototyping, and computer numerical control (CNC) machining the Research Group for Product Engineering and Prototyping at USU is able to quickly design, test and develop products to meet market demands. Through the engineering design process we will be able to meet design criteria and reduce commercialization risks for Cajun Archery.

Domain Surgical, Inc.
CEO/Principal: David J. McNally
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: LS
Award Amt.: $40,000 – University

Surgery requires the cutting and coagulation of bleeding tissues and vessels, as well as the re-attachment of tissues or their destruction. Because of this, a large market has evolved based upon the promise of improved outcomes related to the excision, dissection, hemostasis, and healing of tissue. Many innovations have been introduced in recent years, but many surgeons are still dissatisfied that there is not a tool that meets all the criteria. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; frictionless cutting with elimination of tissue distortion and sticking; on-demand rapid onset and offset of effect as various tissues or bleeding are encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for cardiothoracic surgical procedures.

Enerlyte, LLC
CEO/Principal: Seth M Phillips
Univ.: BYU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE / IT
Award Amt.: $40,000 - University

Enerlyte's intelligent, clean technology, energy conservation program is a revolutionary web-based software for tracking energy efficiency & conservation. The software tracks both user activity and results of utility conservation programs. Using system data, Enerlyte software makes recommendations to users and utilities for improving energy usage. Users get graphs and customized tips on their monthly utility bill. Utilities get an online dashboard providing usage analysis that maximizes utility ROI for each dollar spent on efficiency & conservation. Enerlyte groups users into peer groups (households with similar size/age of home, family size, location, etc.) and monitors changes in energy use when users take specific actions to conserve. Enerlyte's product uniquely addresses both user & utility demand for energy usage information that can lead to improved efficiencies in energy usage & conservation.

Euclid Timber Frames LLC
CEO/Principal: Kip Apostal
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE
Award Amt.: $15,000 – University.

Interlocking Cross Laminated Timber (ICLT) is a prefabricated cross-laminated solid wood wall and roof panel fabricated from 2-5 layers of alternating direction 3" x 6" to 3" x 8" pine stock milled from beetle kill trees. ICLT utilizes no fasteners and no adhesives, removing the reliance on volatile organic compound (toxic) adhesives, allowing the panel to be disassembled at end of life to be repurposed in the building material supply chain. Layering gives the panel strength, allowing low-grade wood to be used in a high value structural situation, estimated to last upwards of 100 years. ICLT can be built up to nine stories in some cases, efficient in speed of construction, and given the availability of material, potentially affordable for both production home building and large commercial structures. This proposal is for ICLT commercialization research between university and industry in preparation for market acceptance in the next two years.

Linear Signal, LLC
CEO/Principal: Greg Mockett
Univ.: BYU
Affiliate/Licensee/Univ.: Affiliate
Cluster: IT
Award Amt.: $40,000 – University.

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at BYU to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

UNIVERSITIES

Large-Scale Semiconductor Nanocrystal Fabrication
CEO/Principal: Michael H. Bartl
Univ.: UU
Affiliate/Licensee/Univ.: UU
Cluster: MMEE / IT
Award Amt.: $40,000 – University

Nanocrystals (1 to 100 nm in size) are considered cornerstones of emerging energy, information, and biomedical technologies due to their unique size-dependent electronic and optical properties. However, their widespread use is severely limited by current high-cost and small-scale fabrication methods requiring high temperatures. In contrast to existing techniques, we have developed a novel synthesis method for high-quality nanocrystals that operates at low reaction temperatures (patents pending). Our method promises enormous impact for commercial applications, since low-temperature synthesis enables easier scale-up (high throughput fabrication) with reduced engineering requirements while keeping high product quality and reproducibility. Moreover, our method uses inexpensive, industry-tested and reusable reaction components (e.g. solvents) and therefore should not only result in significantly reduced manufacturing costs, but also in environmentally-friendlier "greener" fabrication.

Smart Antenna Technology
CEO/Principal: Bedri A. Cetiner
Univ.: USU
Affiliate/Licensee/Univ.: USU
Cluster: IT
Award Amt.: $40,000 – University

The technology developed at USU is an adaptive smart antenna technology that enables a single antenna element to dynamically change its properties such as operation frequency, beam direction, and polarization. An adaptive antenna is an indispensible part of the next generation wireless communications systems such as upcoming 4G systems in order to achieve targeted system performances, i.e., higher data rate, capacity, etc. With the existing technologies for a system to provide dynamically adaptive features, a large number of antennas in conjunction with ancillary electronic components need to be used. The existing technology, therefore, is cost and size prohibitive for commercial wireless systems. On the other hand, our technology provides a superior performance with a single antenna element which can be realized at low cost and size. The microfabrication technology developed by the PI's research group, which will be patented by the USU TCO, is based on a novel microfluidic technology

Smart Occupancy
CEO/Principal: Aravind Dasu
Univ.: USU
Affiliate/Licensee/Univ.: USU
Cluster: IT
Award Amt.: $40,000 – University

The Smart Occupancy Sensor is a dual mode hardware device (Passive IR + Video camera) that can be mounted on a ceiling in an office room, and expected to reliably and near-instantaneously turn lights on when occupied and turn them off when unoccupied. The unique features are: (a) Its response time is ~5 seconds compared to 15-20 minutes for motion sensors, (b) It can be configured and setup via software using a graphical user interface, (c) It does not suffer the infamous 'hand waving' problem that motion sensors do, and (d) It can be upgraded via software updates for daylight aware lighting control and task control.

Trace Explosives Detection
CEO/Principal: Ling Zang
Univ.: UU
Affiliate/Licensee/Univ.: UU
Cluster: MMEE
Award Amt.: $40,000 - University

Portable devices that are suited for infield explosives detection. The sensory materials are composed of well-defined nanofibers fabricated from different building-block molecules. As covered in our five IPs, the nanofibers are highly efficient for vapor detection of explosives, via optoelectronic modulation upon interaction with the targeted explosives. Upon integration into a small chip, the entangled nanofibers form a mesh-like, highly porous film, providing maximal sampling of explosives, enabling expedient vapor detection with unprecedented efficiency (down to ppt range). This is superior to the common solid film-based sensory materials, for which the sampling of trace analysts remains difficult due to the limited surface area. Compared to conventional electronic detection systems like those based on MS or IMS, the nanofibers represent a class of simple, small and adaptable detection system.